**Algebra II Name:**

**Unit 2 Exponential Functions Test Study Guide Date:**

**Part 1: Open Response**

1. What is an exponential function?

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1. How is an exponential function different from a linear function?

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1. What shape do exponential functions have when you graph them on a coordinate plane?

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1. What part of an exponential equation causes the graph to have that shape?

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1. Write out the equation for exponential functions in the space below and identify what each of the variables represents.
2. How can the same equation sometimes cause the starting amount to *grow* and sometimes cause it to *decay*?

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1. When you have exponential *growth* given to you as a percent, how do you use that percent as a growth factor in an equation? Why?

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1. When you have exponential *decay* given to you as a percent, how do you use that percent as a growth factor in an equation? Why?

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**Part 2: Linear or Exponential?**

Determine whether the following situation, table and pattern represents an exponential or linear pattern. Then write the equation. (3 points each)

1. You have $1,500 in your savings account. You are able to add $250 to your account each week.

**Circle One:** Linear or Exponential?   
**Initial value**:   
**Growth rate**:   
**Equation:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *x* | 0 | 1 | 2 | 3 | 4 |
| *y* | 2.5 | 7.5 | 22.5 | 67.5 | 202.5 |

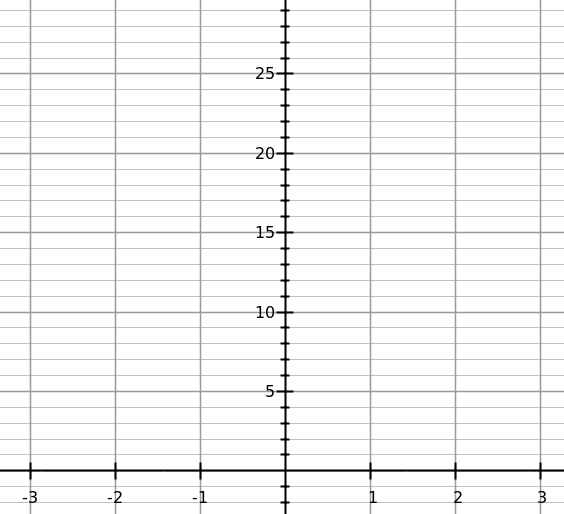
**Circle One:** Linear or Exponential?   
**Initial value**:   
**Growth rate**:   
**Equation:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Step 0** | **Step 1** | **Step 2** | **Step 3** |
|  |  |  |  |

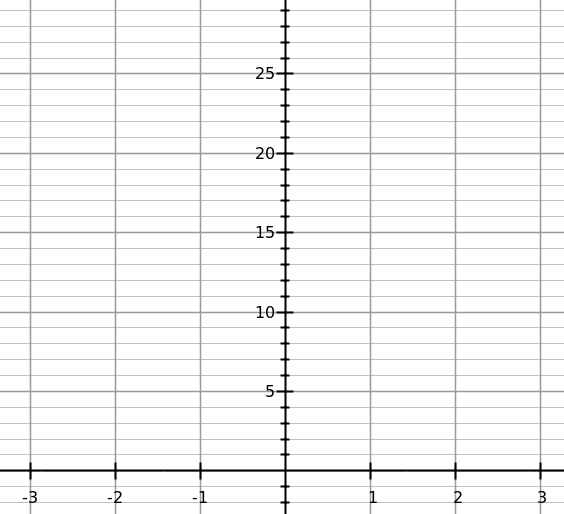
**Circle One:** Linear or Exponential?   
**Initial value**:   
**Growth rate**:   
**Equation:**

**Part 3: Graphing**

Graph the following exponential functions. (Use an input-output table!)

1. Equation:

|  |  |
| --- | --- |
| **x** | **f(x)** |
| **-3** |  |
| **-2** |  |
| **-1** |  |
| **0** |  |
| **1** |  |
| **2** |  |
| **3** |  |

1. Equation:

|  |  |
| --- | --- |
| **x** | **f(x)** |
| **-3** |  |
| **-2** |  |
| **-1** |  |
| **0** |  |
| **1** |  |
| **2** |  |
| **3** |  |

**Part 4: Writing Equations**

Write the equation shown by the following representations of exponential functions.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | |  |  | | **-1** | **3.3333** | | **0** | **4** | | **1** | **4.8** | | **2** | **5.76** |   **Initial value**:  **Growth rate**:  **Equation:** | |  |  | | --- | --- | |  |  | | **-2** | **12** | | **-1** | **6** | | **0** | **3** | | **1** | **1.5** |   **Initial value**:  **Growth rate**:  **Equation:** |
| **Initial value**:  **Growth rate**:  **Equation:** | **Initial value**:  **Growth rate**:  **Equation:** |

**Part 5: Modeling Exponential Growth**

Answer the following questions by modeling the exponential growth described.

|  |
| --- |
| A medicine company is trying to grow a bacteria to test their new medicine. They start with 5 bacteria cells and the number of cells begins doubling every 20 minutes. How many cells will there be in 3 hours?  **Circle one:** growth or decay?  **Initial value**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **Growth rate**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| You invest $1,000 in a savings account with 1.5% interest compounded once per year. How much money will you have in your account in 10 years?  **Circle one:** growth or decay?  **Initial value**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **Growth rate**: \_100%\_(+ or -) \_\_\_\_\_\_ =\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| The value of your home has increased by 1.2% each month. If your home was worth $150,000 when you bought it 7 years ago, how much is it worth now?  **Circle one:** growth or decay?  **Initial value**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **Growth rate**: \_100%\_(+ or -) \_\_\_\_\_\_ =\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| The number of animals of an endangered species is decreasing by 5% each month. If the population started with 15,000 animals, how many will there be in three years?  **Circle one:** growth or decay?  **Initial value**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **Growth rate**: \_100%\_(+ or -) \_\_\_\_\_\_ =\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| You take out a loan to pay for college. The terms of your loan are a 4.2% compounded quarterly. How much money will you owe if you borrowed $10,000 for 10 years?  **Circle one:** growth or decay?  **Initial value**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **Growth rate**: \_100%\_(+ or -) \_\_\_\_\_\_ =\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| A mold colony starts as one cell but is doubling every hour. How many will there be in 2 days?  **Circle one:** growth or decay?  **Initial value**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **Growth rate**: \_100%\_(+ or -) \_\_\_\_\_\_ =\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| The value of your car depreciates by 7% each year. If your car was worth $35,000 when you bought it 10 years ago, how much is it worth now?  **Circle one:** growth or decay?  **Initial value**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **Growth rate**: \_100%\_(+ or -) \_\_\_\_\_\_ =\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |